

SPECIFICATION AMENDMENTS

On page 1, insert above line 1, insert--Priority Claim

The present application claims priority on European Patent Application 03253947.0 filed 23 June 2003.--

On page 1, above line 1, insert--Field of the Invention--

Paragraph on line 1 of page 1 has been amended as follows:

-- The invention is directed relates to a process to prepare a base oil having a viscosity index of above 80 and a saturates content of above 90 wt% from a crude derived feedstock by means of a process comprising a hydrocracking step and a catalytic dewaxing step.--

On page 1, above line 6, insert--Background of the Invention--

Paragraph on line 29 of page 2, ending on line 7 of page 2 has been amended as follows:

-- According to EP-A-921184 the Fischer-Tropsch wax to be used in the disclosed process is isolated from the Fischer-Tropsch synthesis product by only distillation. Typically more than 80% by volume has a boiling point higher than 550 °C. One such wax was exemplified and because a substantially normal-paraffinic mixture is expected for such a direct Fischer-Tropsch wax fraction a congealing point of around 100 °C is estimated. This wax was mixed with a petroleum based waxy distillate having a final boiling point of 579 °C and the mixture was subjected to a hydrocracking step. From the examples it can be seen that when the Fischer-Tropsch wax containing feed was used a large fraction boiling above 635 °C was found in the effluent of the hydrocracker.--

Paragraph on line 12 of page 3 has been amended into two paragraphs, as follows:

~~The object of the present invention is It would be useful to provide a more efficient process to make base oils from a crude derived feedstock wherein use is made of a Fischer-Tropsch derived product in a more efficient manner. This object is achieved with the following process.~~

Summary of the Invention

The invention provides a process **Process** to prepare a base oil having a viscosity index of above 80 and a saturates content of above 90 wt% from a crude derived feedstock **by comprising**

- (a) **contacting** Contacting a crude derived feedstock in the presence of hydrogen with a catalyst comprising at least one Group VIB metal component and at least one non-noble Group VIII metal component supported on a refractory oxide carrier;
- (b) **adding** Adding to the effluent of step (a) or part of the effluent of step (a) a Fischer-Tropsch derived fraction boiling at least partly in the base oil range in an amount effective to achieve the target viscosity index of the final base oil; and
- (c) **dewaxing** Dewaxing the mixture as obtained in step (b).--

On page 3, above line 31, insert--Detailed Description of the Invention--

Paragraph on line 16 of page 5, ending on line 2 of page 6, has been amended as follows:

— It has been found that in the process according to the present invention a base oil may be prepared having the desired VI wherein the conversion in the hydrotreating step is relatively low. This is especially advantageous when also more heavier grades are also desired. The conversion is preferably below 40 and more preferably below 30 wt%. The preliminary hydrotreating step is typically performed using catalyst comprising a metal hydrogenation component, suitably a combination of a Group VIB and a non-noble Group VIII metal, for example cobalt-molybdenum, nickel-molybdenum, on a porous support, for example silica-alumina or alumina. The hydrotreating catalysts suitably contains no zeolite material or a very low content of less than 1 wt%. Examples of suitable hydrotreating catalysts are the commercial ICR 106, ICR 120 of Chevron Research and Technology Co.; 244, 411, DN-120, DN-180, DN-190 and DN-200, DN-3110, DN-3100 and DN-3120 of Criterion Catalyst Co.; TK-555 and TK-565 of Haldor Topsoe A/S; HC-k, HC-P, HC-R and HC-T of UOP; KF-742, KF-752, KF-846, KF-848 STARS and KF-849 of AKZO Nobel/Nippon Ketjen; and HR-438/448 of Procatalyse SA.--

Paragraph on line 8 of page 7 has been amended as follows:

--In step (b) all or part of the effluent of step (a) is mixed with the Fischer-Tropsch derived fraction. Preferably only the fraction of said effluent boiling in the base oil

range is used in step (a). Suitably this fraction has an initial boiling point higher than 300 °C and more preferably higher than 340 °C. A maximum value for the initial boiling point will depend on the desired base oil grade one wishes to prepare.

Paragraph on line 16 of page 7 has been amended as follows:

--The Fischer-Tropsch fraction may in principle be any fraction which boils in the base oil range and which is isolated from the synthesis product of the Fischer-Tropsch reaction. More preferably a partly or ~~whole~~ substantially completely hydroisomerized Fischer-Tropsch wax is used. The use of the isomerised product is preferred because a significant part of the normal paraffins as present in a Fischer-Tropsch synthesis product have then been isomerised to the, for base oil manufacture, more desirable iso-paraffins. The Fischer-Tropsch fraction preferably has a boiling range[[,]] which corresponds with the petroleum derived fraction as used in step (b). --

Paragraph on line 28 of page 7, ending on line 2 of page 9, has been amended as follows:

--The Fischer-Tropsch derived fraction may be obtained by well-known processes, for example the so-called commercial Sasol process, the Shell Middle Distillate Process or by the non-commercial Exxon process. These and other processes are for example described in more detail in EP-A-776959, EP-A-668342, US-A-Pat. No. 4943672, US-A-Pat. No. 5059299, WO-A-9934917 and WO-A-9920720. The process will generally comprise a Fischer-Tropsch synthesis and a hydroisomerisation step as described in these publications. Preferably the fraction will comprise of a substantial amount of compounds boiling in the base oil range. The fraction preferably has a relatively low pour point, which is beneficial when the Fischer-Tropsch fraction has to be transported from remote locations to the base oil process facility. For this reason the Fischer-Tropsch fraction has been partly isomerised. More preferably the Fischer-Tropsch fraction may be partly isomerised to substantially totally isomerised. Preferably the content of normal paraffins in the partly isomerised fraction is between 4 and 20 wt%, more preferably between 5 and 15 wt%. A preferred partly isomerised Fischer-Tropsch fraction will boil for more than 90 wt% above 300 °C and more preferably above 340 °C. The T_{90wt%} T_{90wt%} recovery point is preferably above 500 °C and more preferably between 500 and 650 °C. The fraction will preferably have a congealing point below 80 °C, more preferably below 60 °C and even more preferably below 50 °C. The wax content of this partly isomerised Fischer-Tropsch fraction

is preferably below 50 wt%, more preferably below 30 wt%. The lower wax content of such a fraction is suitably above 1 wt% wax, preferably above 5 wt% wax and more preferably above 10 wt% wax. The wax content is determined by separating the wax component at -27 °C by means of solvent dewaxing using a 50/50 (vol/vol) MEK/Toluene solvent. Distillate fractions of the above described partly isomerised Fischer-Tropsch fraction may also be used in the process of the present invention when one seeks to improve only the properties of a specific base oil grade as also explained below. An example of a suitable partly isomerised fraction is the so-called Shell MDS Waxy Raffinate as obtainable from Shell MDS (Malaysia) Sdn Bhd or the product as described in WO-A-02070630 or fractions of said products. Partly isomerised Fischer-Tropsch feeds may be used in processes involving both solvent and catalytic dewaxing.--

Paragraph on line 3 of page 9 has been amended as follows:

-- As described above, the isomerised Fischer-Tropsch fraction may be substantially totally isomerised. The degree of total isomerisation is expressed in its pour point, which is for such a totally isomerised fraction below -10 °C and suitably below -15 °C. These oils may be obtained by dewaxing the above-described partly isomerised Fischer-Tropsch fraction or by performing the hydroisomerisation step at a high conversion, suitably above 50 wt% per pass, preferably above 60 wt% on a preferably heavy Fischer-Tropsch wax feed having a weight ratio of compounds having more than 60 carbon atoms relative to compounds having more than 30 carbon atoms of above 0.4, preferably above 0.55. The conversion is defined as the compounds boiling above 370 °C in the feed that are converted to compounds boiling below 370 °C. These totally isomerised fractions may be considered to be suitable to be used as base oils themselves. However they contain for some uses a too high a content of paraffins, which paraffins influences the solvency for additives in a negative manner. By using a blend of this isomerised Fischer-Tropsch fraction in step (b) it is possible to prepare a base oil in step (c) which will have the desired level of paraffins at exactly the right pour point of the end product. If the dewaxed oil is fractionated to separate light components and optionally isolate more than one base oil grade a base oil product is obtained having also just the right Noack volatility and viscosity. This would not be achieved in such a simple manner if the totally isomerised Fischer-Tropsch fraction was to be added to a finished base oil because properties like viscosity, volatility and pour point would in most cases not match such to obtain exactly the desired base oil product.--

Paragraph on line 1 of page 10 has been amended as follows:

-- The totally isomerised Fischer-Tropsch fraction will preferably boil for more than 90 wt% above 300 °C and more preferably above 340 °C. The T_{90wt%} T_{90wt%} recovery point is preferably above 500 °C and more preferably between 500 and 650 °C.

Distillate fractions of this totally isomerised Fischer-Tropsch fraction may also be used in the process of the present invention when one seeks to improve only the properties of a specific base oil grade as also explained below.

Paragraph on line 10 of page 10 has been amended as follows:

-- Alternatively, but less preferred than the partly or totally isomerised Fischer-Tropsch products, one may use as the Fischer-Tropsch fraction the n-paraffin waxes as obtainable from said Fischer-Tropsch processes having preferably a congealing point of between 20 and 80 °C. Examples are SX-30, SX-50 and SX-70 as obtainable from Shell MDS (Malaysia) Sdn Bhd. If such waxes are used a catalytic dewaxing in step (c) is preferred, more preferably a dewaxing catalyst is used having a high ability to isomerise the normal paraffins. See ~~for preferred catalysts below. Of course fractions~~ Fractions having similar properties as described above as obtainable from other processes may also be advantageously used in our invention.--

Paragraph on line 27 of page 11, ending on line 23 of page 12, has been amended as follows:

--Preferably step (c) is performed by means of a catalytic dewaxing process. The catalytic dewaxing step (c) can be performed by any process wherein in the presence of a catalyst and hydrogen the pour point of the base oil precursor fraction is reduced as specified above. Suitable dewaxing catalysts are heterogeneous catalysts comprising a molecular sieve and optionally in combination with a metal having a hydrogenation function, such as the Group VIII metals. Molecular sieves, and more suitably intermediate pore size zeolites, have shown a good catalytic ability to reduce the pour point of the distillate base oil precursor fraction under catalytic dewaxing conditions. Preferably the intermediate pore size zeolites have a pore diameter of between 0.35 and 0.8 nm. Suitable intermediate pore size zeolites are mordenite, ZSM-5, ZSM-12, ZSM-22, ZSM-23, SSZ-32, ZSM-35 and ZSM-48. Catalysts having a high ability to isomerise normal paraffins will preferably comprise ZSM-12, ZSM-22, ZSM-23 or SSZ-32. Another preferred group of

molecular sieves are the silica-aluminaphosphate (SAPO) materials of which SAPO-11 is most preferred as for example described in US-A-Pat. No. 4859311. ZSM-5 may optionally be used in its HZSM-5 form in the absence of any Group VIII metal. The other molecular sieves are preferably used in combination with an added Group VIII metal. Suitable Group VIII metals are nickel, cobalt, platinum and palladium. Examples of possible combinations are Ni/ZSM-5, Pt/ZSM-23, Pd/ZSM-23, Pt/ZSM-48 and Pt/SAPO-11. Further details and examples of suitable molecular sieves and dewaxing conditions are for example described in WO-A-9718278, US-A-Pat. No. 5053373, US-A-Pat. No. 5252527, US-A-Pat. No. 4574043, WO-A-2004033594 and WO-A-2004033593.--

Paragraph on line 24 of page 12 has been amended as follows:

-- The dewaxing catalyst suitably also comprises a binder. The binder ~~can~~may be a synthetic or naturally occurring (inorganic) substance, for example clay, silica and/or metal oxides. Natural occurring clays are for example of the montmorillonite and kaolin families. The binder is preferably a porous binder material, for example a refractory oxide of which examples are: alumina, silica-alumina, silica-magnesia, silica-zirconia, silica-thoria, silica-beryllia, silica-titania as well as ternary compositions for example silica-alumina-thoria, silica-alumina-zirconia, silica-alumina-magnesia and silica-magnesia-zirconia. More preferably a low acidity refractory oxide binder material, which is essentially free of alumina, is used. Examples of these binder materials are silica, zirconia, titanium dioxide, germanium dioxide, boria and mixtures of two or more of these of which examples are listed above. The most preferred binder is silica.--

Paragraph on line 7 of page 13 has been amended as follows:

--A preferred class of dewaxing catalysts comprise intermediate zeolite crystallites as described above and a low acidity refractory oxide binder material which is essentially free of alumina as described above, wherein the surface of the aluminosilicate zeolite crystallites has been modified by subjecting the aluminosilicate zeolite crystallites to a surface dealumination treatment. A preferred dealumination treatment is by contacting an extrudate of the binder and the zeolite with an aqueous solution of a fluorosilicate salt as described in for example US-A-Pat. No. 5157191 or WO-A-2000029511. Examples of suitable dewaxing catalysts as described above are silica bound and dealuminated Pt/ZSM-5, silica bound and dealuminated Pt/ZSM-23, silica bound and dealuminated Pt/ZSM-12,

silica bound and dealuminated Pt/ZSM-22 as for example described in WO-A-200029511
and EP-B-832171.-

Table 3 on page 21 has been amended as follows:

| Experiment | | A-1 | A-2 | A-3 |
|-------------------------------|-----|----------------------------------|----------------------------------|----------------------------------|
| Reactor temperature | °C | 336 | 341 | 346 |
| Pour point | °C | -11 | -23 | -35 |
| Viscosity index | - | 103 | 100 | 94 |
| Kinematic viscosity at 100 °C | cSt | <u>11.51</u> 11,51 | <u>11.77</u> 11,77 | <u>12.89</u> 12,89 |

On page 22 above line 1, insert --We claim:--